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A signal transmission apparatus comprising:

a modulator operable to assign and interleave a data stream of a layer A and a data stream of a layer B to a respective constellation in a signal space to produce a modulated signal of the layer A and a modulated signal of the layer B;

an inverse fast Fourier transformer operable to convert the modulated signal of the layer A into a transmission signal on a time axis in the layer A and to convert the modulated signal of the layer B into a transmission signal on a time axis in the layer B, wherein each transmission signal comprises an effective symbol signal and a guard interval signal, and a period of the guard interval signal in the layer A is larger than the period of the guard interval signal in the layer B; and

a transmitter operable to transmit the transmission signals.

7. A signal receiving apparatus for use in receiving a modulation signal in a layer A and a modulation signal in a layer B, wherein the modulation signals each include a guard interval signal, said apparatus comprising:

a fast-Fourier transformer operable to convert the modulation signal in the layer A into a converted signal on a frequency axis in the layer A and to convert the modulation signal in the layer B into a converted signal on a frequency axis in the layer B; and

a demodulator operable to de-interleave the converted signals, demodulate the converted signal in the layer A into a data stream of the layer A and to demodulate the converted signal in the layer B into a data stream of the layer B;

wherein a period of the guard interval signal in the layer A is larger than a period of the guard interval signal in the layer B.

8. A signal transmission system comprising:

a signal transmission apparatus including

a modulator operable to assign and interleave a data stream of a layer A and a data stream of a layer B to a respective constellation in a signal space to produce a modulated signal of the layer A and a modulated signal of the layer B,

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an inverse fast Fourier transformer operable to convert the modulated signal of the layer A into a transmission signal on a time axis in the layer A and to convert the modulated signal of the layer B into a transmission signal on a time axis in the layer B, wherein each transmission signal comprises an effective symbol signal and a guard interval signal, and a period of the guard interval signal in the layer A is larger than a period of the guard interval signal in the layer B, and

a transmitter operable to transmit the transmission signals; and  
a signal receiving apparatus including

a receiver operable to receive the transmission signal in the layer A and the transmission signal in the layer B,

a fast-Fourier transformer operable to convert the transmission signal in the layer A into a converted signal on a frequency axis in the layer A and to convert the transmission signal in the layer B into a converted signal on a frequency axis in the layer B, and

a demodulator operable to de-interleave the transmission signals, demodulate the converted signal in the layer A into a data stream of the layer A and to demodulate the converted signal in the layer B into a data stream of the layer B.

9. A signal transmission method comprising:

assigning and interleaving a data stream of a layer A and a data stream of a layer B to a respective constellation in a signal space to produce a modulated signal of the layer A and a modulated signal of the layer B;

inverse fast Fourier transforming the modulated signal of the layer A into a transmission signal on a time axis in the layer A and inverse fast Fourier transforming the modulated signal of the layer B into a transmission signal on a time axis in the layer B, wherein each transmission signal comprises an effective symbol signal and a guard interval signal, and a period of the guard interval signal in the layer A is larger than a period of the guard interval signal in the layer B; and

transmitting the transmission signals.

10. A signal receiving method for use in receiving a modulation signal in a layer A and a modulation signal in a layer B, wherein the modulation signals each include a guard interval signal, and a period of the guard interval signal in the layer A is larger than a period of the guard interval signal in the layer B, said method comprising:

fast-Fourier transforming the modulation signal in the layer A into a converted signal on a frequency axis in the layer A and fast-Fourier transforming the modulation signal in the layer B into a converted signal on a frequency axis in the layer B; and

de-interleaving the modulation signals, demodulating the converted signal in the layer A into a data stream of the layer A and demodulating the converted signal in the layer B into a data stream of the layer B. --